Northwest Power and Conservation Council



March 6, 2012

# MEMORANDUM

**TO:** Power Committee members

**FROM:** John Fazio, Senior Power System Analyst

**SUBJECT:** Assumptions used for Adequacy Assessments

In December of 2011, the Council adopted a revised resource adequacy standard for the Pacific Northwest. For the power supply to be deemed adequate, the likelihood of having to take serious measures to avoid a shortfall must be 5 percent or less. This metric, known as the loss-of-load probability (LOLP), is very sensitive to certain assumptions regarding the power supply. The Council tasked the Resource Adequacy Forum with identifying and updating these key assumptions, which include,

- In-region and out-of-region market supply
- Market access and transmission constraints
- Borrowed hydro (water below the drafting rights rule curve)
- Wind generation
- Conservation
- Emergency actions (referred to as standby resources)
- How to include load and conservation uncertainty

During winter, all NW independent power producer (IPP) resources (about 3500 MW) are assumed to be available along with about 3200 MW of out-of-region supply. During summer, both IPP resources and the SW market are limited to1000 MW each, however, the SW market is further limited to be available only during off-peak hours. No market "friction" or transmission constraints are modeled at this time. Borrowed hydro is limited to a maximum of 1000 MWa per month, a value that will not affect winter flow requirements for Chum or April refill probabilities. Wind generation is modeled by drawing from a 40-year set of synthetic hourly capacity factors, which are multiplied by the installed capacity. Conservation levels reflect the expected amounts from the 6$^{th}$ power plan. Standby resources are limited to demand side actions or generating resources that are contractually available to utilities and are not intended to be used often or for very long when they are called into action. Uncertainties in load and conservation achievement will be used to delineate between the yellow and green alert status, that is, if the LOLP including higher loads and less conservation is greater than 5% then the status is yellow.

All of these assumptions are pending approval of the Forum's steering committee.

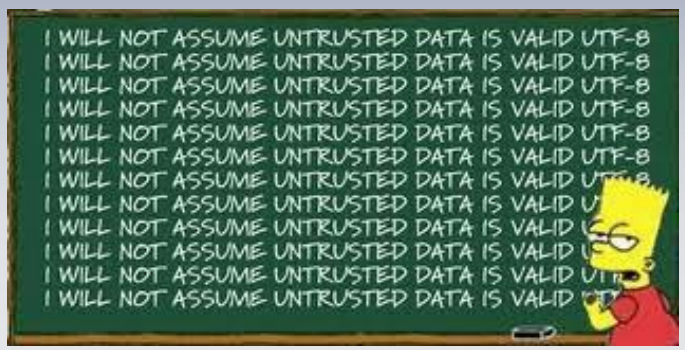


851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

**Steve Crow**
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

# Assumptions used for Adequacy Assessments




Power Committee Meeting
March 6, 2012
Portland, Oregon

Northwest Power and Conservation Council

1

# Death by PowerPoint

And now, let's dim the lights, so I can carefully read the text, exactly as it appears, on hundreds of computer slides!*

*My advanced apology for a rather bland presentation.

Northwest Power and Conservation Council

2

# Why talk about assumptions?

- Garbage in, garbage out!
  Let's check the garbage in
- Results sensitive to key assumptions
- Adequacy assumptions ≠
  resource planning assumptions

Northwest Power and Conservation Council

3

# Adequacy Assumptions
(Pending Approval of Steering Committee)

- Market Supply
- Market Access
- Hydro Flexibility (Borrowed Hydro)
- Wind
- Thermal Resources and Conservation
- Emergency Actions (standby resources)
- Uncertainty in Load and Conservation

Northwest Power and Conservation Council

4

## Adequacy Assessment ≠ Resource Planning

- Adequacy Assessment = early warning should resource development fall short
- Resource Planning = acquisition strategy that produces an adequate, efficient, economical and reliable power supply
- Adequacy assessment is a part of resource planning

Northwest Power and Conservation Council

5

## Treatment of Market Supply

### Adequacy vs. Resource Planning

- Adequacy = ***realistic assumption*** for available market and non-firm supply during periods of stress
- Resource Planning = ***policy decision***, based on economic considerations, about how much market supply to plan for

Northwest Power and Conservation Council

6

# In-region Market

- Made up of independent power producers
- Winter
  - Full capability (about 3,500 MW)
- Summer
  - 1,000 MW max

Northwest Power and Conservation Council

7

# Out-of-region Market

- Assumed to be from SW coming in over the NW-SW interties
- Winter (on peak)
  - Min of tie capacity and Once-Through-Cooling adjusted surplus
  - About 3,200 MW 2015, lower for 2017
- Summer (on peak)
  - None
- Summer (off peak, purchase ahead)
  - 1000 MW

Northwest Power and Conservation Council

8

## Market Access – Not Modeled

Due to difficulties in defining or coding

- Market "friction" – inefficiencies in market transactions
- Sell-ahead market – pre-committed resources could limit supply
- Transmission bottlenecks – some utilities don't have full access to all markets
- Will use uncertainty in load/conservation as a surrogate for this

Northwest Power and Conservation Council

9

## Borrowed Hydro

- Energy derived from drafting below "drafting right" elevations for short periods, then replaced as soon as possible
- Available all months
- Maximum allowable per month
  - 1,000 megawatt-months
- Maximum used per hour
  - Ranges from 2,500 to 3,000 MW

Northwest Power and Conservation Council

10

# Wind Resources

- 40 synthetic wind-year profiles, each profile contains 8,760 capacity factors that represent how wind would operate
- Currently using historic 2008-10 data from BPA wind fleet
- Future work to adjust for extreme temperatures
- Need to develop wind profiles for other sites

Northwest Power and Conservation Council

11

# Thermal Resources and Conservation

- Thermal resources
  - Existing
  - Expected to be operational by the study date
- Conservation
  - 6th plan expected level by study date
  - Built into the hourly load profiles

Northwest Power and Conservation Council

12

## Standby Resources

- Resources or demand side actions
- Contractually available to utilities
- Not designed to be used often
- Very small amounts
  - Energy is about 160,000 MW-hour/year based on a max of 4o0 operating hours
  - Capacity 600 to 700 MW

Northwest Power and Conservation Council

13

## Uncertainty in Loads and Conservation

- Economic load growth and conservation assumptions are essentially point forecasts
- How can we address the uncertainty in these values?
- Solution = use the range of uncertainty to delineate between the red, yellow and green status for the power supply
- Calculate $LOLP_U$, which is the LOLP assessed with higher loads and lower conservation

Northwest Power and Conservation Council

14

# Alert Status

- Red = warning, resources are too low
  LOLP > 5%
- Yellow = caution, resources getting low
  LOLP < 5% and $LOLP_U$ > 5%
- Green = adequate
  $LOLP_U$ < 5%

Northwest Power and Conservation Council

15